UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/741,724	12/19/2000	Santhana Krishnamachari	US000335	7516

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EXAMINER
DO, CHAT C

ART UNIT	PAPER NUMBER
2124	

DATE MAILED: 11/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	09/741,724	KRISHNAMACHARI ET AL.
	Examiner	Art Unit
	Chat C. Do	2124

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12/19/00;7/20/01;9/9/02;4/25/03* .

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-15 and 17-28* is/are rejected.

7)☒ Claim(s) *2 and 16* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 July 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

    If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____ .

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

    a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)	4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)	5) ☐ Notice of Informal Patent Application (PTO-152)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *2* .	6) ☐ Other:

DETAILED ACTION

Drawings

1.   The drawings are objected to because the specification does not address the bottom half

in Figure 2 (the loop process). A proposed drawing correction or corrected drawings are

required in reply to the Office action to avoid abandonment of the application. The objection to

the drawings will not be held in abeyance.

Specification

2.   Applicant is reminded of the proper language and format for an abstract of the disclosure.

        The abstract should be in narrative form and generally limited to a single paragraph on a
separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed
150 words in length since the space provided for the abstract on the computer tape used by the
printer is limited. The form and legal phraseology often used in patent claims, such as "means"
and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist
readers in deciding whether there is a need for consulting the full patent text for details.

        The language should be clear and concise and should not repeat information given in the
title. It should avoid using phrases which can be implied, such as, "The disclosure concerns,"
"The disclosure defined by this invention," "The disclosure describes," etc.

3.   The abstract of the disclosure is objected to because the abstract exceeds 150 words in

length. Correction is required. See MPEP § 608.01(b).

4.   The disclosure is objected to because of the following informalities:

        In the abstract, a period (.) is required at the end of abstract.

        Throughout the specification, the acronym "DSPCPU" should be written in full.

        Appropriate correction is required.

Claim Rejections - 35 USC § 102

5.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on
> sale in this country, more than one year prior to the date of application for patent in the United States.

6.   Claim 27 is rejected under 35 U.S.C. 102(b) as being anticipated by Chen et al. (U.S.

5,999,958).

Re claim 27, Chen et al. disclose a decoder which scales video and still image

decoding computational complexity with available computational resources (abstract as

IDCT processes), the decoder comprising: a variable length decoder (col. 6 lines 33-38);

an inverse quantizer which dequantizes signals received from the variable length decoder

(col. 1 lines 29-31); and an approximate inverse discrete cosine transform (lines 7-12 in

abstract) that scales decoding computational complexity in accordance with maximum

available quantities of computational resource units (col. 1 lines 12-16).

Claim Rejections - 35 USC § 103

7.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

8.   Claims 1, 3-11, 13-15, and 17-26 are rejected under 35 U.S.C. 103(a) as being obvious

over Riolfo (U.S. 4,849,922).

Re claim 1, Riolfo discloses in Figure 2 a method of scaling image and video

processing computational complexity in accordance with maximum available quantities

of computational resource units (col. 1 lines 26-32), the method comprising the steps of:

(a) performing a plurality of data multiplications which processes digital image and video

data, each data multiplication having a data dependent value multiplied by data

independent value (multiplication processes in DCT transform computation as seen in

col. 8 lines 39-50); (b) selecting one of the data multiplications (col. 8 line 45); (c)

selecting a shift-operation using the data independent value associated with the selected

multiplication and (d) performing the selected multiplication with the selected shift-

operation (col. 2 lines 28-32). Riolfo does not disclose the performance of each data

multiplication requiring a predetermined quantity of computational resource units and

perform the multiplication by shift-add operation if a quantify of computational resource

units is less than the predetermined quantity of computational resource units required for

performing the selected multiplication. However, Riolfo discloses throughout disclosure

that the key of improving DCT transform computation is to reduce the processing time

(col. 1 line 44) and simplify the hardware (col. 2 lines 52-54). In addition, Riolfo

discloses that the processing time between direct multiplication operation and shift-add

operation is depending on the number of bits (e.g. equations in col. 2 lines 66-67 for

multiplication by shift-add operation and equations in col. 1 lines 55-56 for direct

multiplication operations). Therefore, it would have been obvious to a person having

ordinary skill in the art at the time the invention is made to add a mechanism to select

either between the direct multiplication operation and the indirect multiplication by shift-

add operation using a computational resource units (e.g. processing time) wherein the

advantage is clearly addressed in Riolfo because it would enable to reduce

space/hardware requirements, computing time, and power dissipation (col. 2 lines 52-54).

Re claim 3, Riolfo further discloses in Figure 2 the data independent value is a

single power of two and the selected shift-operation includes a single shift made

according to the single power of two (col. 9 lines 51-57).

Re claim 4, Riolfo further discloses in Figure 2 the data independent value is a

sum of powers of two and the selected shift-operation includes at least one shift-operation

corresponding to one of the powers of the sum (table 3 in col. 9).

Re claim 5, Riolfo further discloses in Figure 2 the at least one shift-operation

approximates the selected multiplication (col. 2 lines 57-60).

Re claim 6, Riolfo further discloses in Figure 2 the selected shift-operation

includes at least two shift-operations the results of which are added, the at least two shift-

operations corresponding to two of the powers of the sum (table 3 in col. 9).

Re claim 7, Riolfo further discloses in Figure 2 the power of the sum

corresponding to the at least one shift-operation has a value which is nearest to the data

independent value (table 3 in col. 9).

Re claim 8, Riolfo further discloses in Figure 2 wherein the data independent

value is a difference of powers of two and the selected shift-operation includes at least

one shift operation corresponding to one of the powers of the difference (e.g. 43, 35, 84

in table 3 in col. 9).

Re claim 9, Riolfo further discloses in Figure 2 the at least one shift-operation approximates the selected multiplication (col. 2 lines 57-60).

Re claim 10, Riolfo further discloses in Figure 2 wherein the power of the difference corresponding to the at least one shift-operation has a value which is nearest to the data independent value (table 3 in col. 9).

Re claim 11, Riolfo further discloses in Figure 2 the selected shift-operation includes at least two shift-operations the results of which are subtracted, the at least two shift operations corresponding to two of the powers of the difference (e.g. 43, 35, 84 in table 3 in col. 9).

Re claim 13, Riolfo further discloses in Figure 2 wherein the plurality of data multiplications form a multiple stage network having an input and an output, the selected multiplication is selected from a stage of the network which is nearest the output thereof (table 3 in col. 9).

Re claim 14, Riolfo further discloses in Figure 2 the image and video processing includes image and video decoding and the digital image and video data is encoded digital image and video data (col. 1 lines 26-31).

Re claim 15, it has the same limitation as cited in claim 1. Thus, claim 15 is also rejected under the same rationale in the rejection of rejected claim 1.

Re claim 17, it has the same limitation as cited in claim 3. Thus, claim 17 is also rejected under the same rationale in the rejection of rejected claim 3.

Re claim 18, it has the same limitation as cited in claim 4. Thus, claim 18 is also rejected under the same rationale in the rejection of rejected claim 4.

Re claim 19, it has the same limitation as cited in claim 5. Thus, claim 19 is also rejected under the same rationale in the rejection of rejected claim 5.

Re claim 20, it has the same limitation as cited in claim 7. Thus, claim 20 is also rejected under the same rationale in the rejection of rejected claim 7.

Re claim 21, it has the same limitation as cited in claim 6. Thus, claim 21 is also rejected under the same rationale in the rejection of rejected claim 6.

Re claim 22, it has the same limitation as cited in claim 8. Thus, claim 22 is also rejected under the same rationale in the rejection of rejected claim 8.

Re claim 23, it has the same limitation as cited in claim 9. Thus, claim 23 is also rejected under the same rationale in the rejection of rejected claim 9.

Re claim 24, it has the same limitation as cited in claim 10. Thus, claim 24 is also rejected under the same rationale in the rejection of rejected claim 10.

Re claim 25, it has the same limitation as cited in claim 11. Thus, claim 25 is also rejected under the same rationale in the rejection of rejected claim 11.

Re claim 26, it has the same limitation as cited in claim 13. Thus, claim 26 is also rejected under the same rationale in the rejection of rejected claim 13.

9.   Claim 12 is rejected under 35 U.S.C. 103(a) as being obvious over Riolfo (U.S. 4,849,922), as applied to claim 1 above, in view of Chen et al. (U.S. 5,999,958).

Re claim 12, Riolfo does not the plurality of data multiplications defines an inverse discrete cosine transform. However, Chen et al. disclose in col. 1 lines 29-33 that the DCT and IDCT are inverse of each other and the schemes of both are very similar.

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention is made to apply the multiplications in an inverse discrete cosine transform as seen in Chen et al.'s invention into Riolfo's invention because it would enable to reduce space/hardware requirements, computing time, and power dissipation.

10.   Claim 28 is rejected under 35 U.S.C. 103(a) as being obvious over Chen et al. (U.S. 5,999,958), as applied to claim 27 above, in view of Riolfo (U.S. 4,849,922).

Re claim 28, Chen et al. disclose a decoder performing a plurality of data multiplications which processes digital image and video data (col. 1 lines 20-25), each data multiplication having a data dependent value multiplied by data independent value (col. 1 lines 35-55), and the transform performs at least one of the data multiplication with a shift-operation (abstract). Chen et al. do not disclose the performance of each data multiplication requiring a predetermined quantity of computational resource units and perform the multiplication by shift-add operation if a quantify of computational resource units is less than the predetermined quantity of computational resource units required for performing the selected multiplication. However, Riolfo discloses throughout disclosure that the key of improving DCT transform computation is to reduce the processing time (col. 1 line 44) and simplify the hardware (col. 2 lines 52-54). In addition, Riolfo discloses that the processing time between direct multiplication operation and shift-add operation is depending on the number of bits (e.g. equations in col. 2 lines 66-67 for multiplication by shift-add operation and equations in col. 1 lines 55-56 for direct multiplication operations). Therefore, it would have been obvious to a person having

ordinary skill in the art at the time the invention is made to add a mechanism to select

either between the direct multiplication operation and the indirect multiplication by shift-

add operation using a computational resource units (e.g. processing time) wherein the

advantage is clearly addressed in Riolfo into Chen et al.'s invention because it would

enable to reduce space/hardware requirements, computing time, and power dissipation

(col. 2 lines 52-54).

Allowable Subject Matter

11.   Claims 2 and 16 would be allowable if rewritten to overcome the rejection(s) under 35

U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations

of the base claim and any intervening claims.

Conclusion

12.   The prior art made of record and not relied upon is considered pertinent to applicant's

disclosure.

    a.   U.S. Patent No. 5,864,494 to Toyoyama et al. disclose a discrete cosine

transformer and inverse discrete cosine.

    b.   U.S. Patent No. 6,223,195 to Tonomura et al. disclose a discrete cosine high-

speed arithmetic unit and related arithmetic unit.

    c.   U.S. Document to Sadiq et al. disclose a novel techique for fast multiplication.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chat C. Do whose telephone number is (703) 305-5655. The examiner can normally be reached on M => F from 7:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chaki Kakali can be reached on (703) 305-9662. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Chat C. Do
Examiner
Art Unit 2124

November 11, 2003

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